School Curriculum and Standards Authority

CURRICULUM AND ASSESSMENT OUTLINE

ASSESSMENT ACTIVITY YEAR 1

SCIENCE

Melting an iceberg
(Ref: Howitt. C & Blake. E (ed) (2010) Planting the seeds of science. Australian Learning and Teaching Council p112)

Section 1: Summary

Background information

Brief Description of Assessment Activity	This program of work focuses on developing students' ideas about the time and energy needed to heat/melt large objects. Through a combination of individual work and group work students investigate what changes occur to water when it is heated or cooled. These understandings are then represented through a combination of pictorial representations (before and after); predicting and actual time; data gathering; written explanations and interpretation (simple conclusion) of data.			
Context summary	A cohort of year 1 students with a varying ability range, one gifted child, 2 ESL learners and 1 student with language delay.			
Purpose	Formative		Summative	
Description of purpose	This series of activities enables the assessment of students' ability to describe objects and events that they encounter in their everyday lives, and the effects of interacting with these materials and objects.			
Audience Suitability	At Year Level	Extension	Students with disability	EAL/D

Summary of links to the Australian Curriculum

Content Strand	**Science Understanding**	**Science as Human Endeavour**	**Science Inquiry Skills**
Sub-Strand	Biological Sciences	Use and influence of science	Questioning and predicting
	Chemical Sciences		Planning and conducting
	Earth and Space Sciences	Nature and development of science	Processing and analysing data and information
	Physical Sciences		Evaluating
			Communicating

General capabilities	Literacy	Numeracy	ICT capability	Critical and creative thinking	Ethical behaviour	Personal and social capability	Intercultural understanding

Cross-curriculum priorities	Aboriginal and Torres Strait Islander histories and cultures	Asia and Australia's engagement with Asia	Sustainability

School Curriculum and Standards Authority

CURRICULUM AND ASSESSMENT OUTLINE

ASSESSMENT ACTIVITY YEAR 1

SCIENCE

Melting an iceberg
(Ref: Howitt. C & Blake. E (ed) (2010) Planting the seeds of science. Australian Learning and Teaching Council p112)

Section 2: Links to the Australian Curriculum

Science –Year 1

Content descriptions	Relevant Aspects of the Achievement Standard *Highlighted (grey 25%) areas show the parts of the achievement standard relevant to this task*
Science Understanding Chemical Sciences • Everyday materials can be physically changed in a variety of ways (ACSSU018) **Science as Human Endeavour** Nature and development of science • Science involves asking questions about, and describing changes in, objects and events (ACSHE021) • People use science in their daily lives, including when caring for their environment and living things (ACSHE022) **Science Inquiry Skills** Questioning and predicting • Respond to and pose questions, and make predictions about familiar objects and events (ACSIS024) Planning and conducting • Participate in different types of guided investigations to explore and answer questions, such as manipulating materials, testing ideas, and accessing information sources (ACSIS025) Processing and analysing data and information • Through discussion, compare observations with predictions (ACSIS212) Evaluating • Compare observations with those of others (ACSIS213) Communicating • Represent and communicate observations and ideas in a variety of ways such as oral and written language, drawing and role play (ACSIS029)	By the end of Year 1, students describe objects and events that they encounter in their everyday lives, and the effects of interacting with materials and objects. They identify a range of habitats. They describe changes to things in their local environment and suggest how science helps people care for environments. Students make predictions, and investigate everyday phenomena. They follow instructions to record and sort their observations and share their observations with others.

SCIENCE

Melting an iceberg
(Ref: Howitt. C & Blake. E (ed) (2010) Planting the seeds of science. Australian Learning and Teaching Council p112)

Section 3: Overview of the activity and prior learning

The integrated unit of work is focused on 'Super-heroes' and the powers they have. These science experiments are planned to help the children understand how much power a super hero would need to 'melt' things.

The activities should help children to begin to understand:
- the process of scientific enquiry
- that you can ask a question and then investigate it
- that predictions are like 'guessing' and it's okay to be wrong
- the importance of keeping the experiment 'valid' by keeping the conditions the same (not changing anything halfway through).

To determine what the children already know before we begin the experiments the children will:
- participate in a brainstorming session about what they already know about melting ice
- record on an individual data sheet their predictions
- discuss with peers.

The children have limited experience in recording their predictions or their findings. At the end of this unit of work they will have a better understanding of prediction; recording their predictions and their findings. To achieve this, the children will:
- make individual predictions
- work in small groups and make a group prediction
- record their predictions in different ways
- record their findings in a class graph
- write about their findings.

Assessment
After this series of lessons a rubric will be used to determine children's level of skills and abilities (i.e. follow directions/instructions, think of their own ideas, record their observations and discuss their findings). This rubric was used to help in planning following lessons.

SCIENCE

Melting an iceberg
(Ref: Howitt. C & Blake. E (ed) (2010) Planting the seeds of science. Australian Learning and Teaching Council p112)

Section 4: Sequenced activities

Lesson 1

Before the experiment of melting an iceberg we investigate melting ice-cubes and ice blocks in the classroom and in our playground.

Brainstorm 'What is an iceberg" to elicit children's prior knowledge (see extension).
Discuss the super power of 'melting' things and how long the children think this would take.

Introduce the idea of being a scientist and investigating how things melt and how long it takes.

Individual work
Question: "How long will it take for an ice-cube to melt? An ice-block? An iceberg?"
The children record their individual predictions without discussion and then write their secret predictions on a record sheet.

As a class we time and record how long it will take to melt an ice-cube in the classroom. **(Experiment 1)**

Conclusion: Discussion about why it took so long, what would make it faster?

Why did some groups' ice-cubes melt before other groups'?

After melting the ice-cube:
The children have an opportunity to record any revised predictions (Look at how long they said it would take to melt an ice block? An iceberg? Did they want to revise their prediction?)

Differentiation

ESL and Language delay children were supported to ensure they understood the activities to participate fully.

Extension activities: Investigate icebergs (actual size) in the library and report findings to the class.

Lesson 2

Note: After the ice-block took a long time to melt we revised the second lesson and investigated how we could make the ice melt more quickly. **(Experiment 2)**

Whole class
After a discussion about how long it took to melt our ice-cubes in the classroom the children thought of ideas as to how they could melt the ice more quickly.

Individual work
The children recorded their individual ideas of how to melt the ice-cube faster.

Group work
Three main ideas were explored: outside; in the kitchen and in the classroom. Three groups proceeded with their ideas under teacher supervision. A timer called the times and the children recorded how long their suggested idea took.

Individual children were helped to express and record their ideas.

SCIENCE

Melting an iceberg
(Ref: Howitt. C & Blake. E (ed) (2010) Planting the seeds of science. Australian Learning and Teaching Council p112)

Lesson 3

Whole class
Brainstorm all the places in the school to investigate melting ice. Each group (5) chose a place to melt their ice-block.

Group work
In groups of 5 the children discussed their individual predictions and reasons for these and then made a group prediction. Children recorded any changes they wanted to make and why .

Each group had a scribe to record results; 2 timers and 2 equipment carriers.

The children then filled in a group recording sheet.

Predictions:
What do you think will happen to the Ice-block? Do you think the ice-block will take longer to melt than the ice-cube?

Note: During this lesson the children discovered the importance of making experiments 'valid'.

Lesson 4

Note: The whole school was asked to bring water frozen in an ice-cream container to build our iceberg. (Experiment 3)

Whole class
The children help to build the iceberg (photos to record). We have agreed we will begin timing the iceberg melting from the first bell.

Group work
Each group will check the iceberg at ½ hour intervals throughout the day (revised times if it melts quickly!). A photo will be taken each time it is checked.

During our investigation:
Children had opportunities to revise their predictions at the end of the first day.

Photos were displayed with comments from the children.

Lesson 5

Language lesson
The children brainstormed describing words for the ice experiments and added to the display.

The record sheet with predictions and data collection were placed in children's learning journey file.

School Curriculum and Standards Authority

CURRICULUM AND ASSESSMENT OUTLINE

ASSESSMENT ACTIVITY YEAR 1

SCIENCE

Melting an iceberg
(Ref: Howitt. C & Blake. E (ed) (2010) Planting the seeds of science. Australian Learning and Teaching Council p112)

Supporting Materials

Our questions are …
How long will it take for an ice-cube to melt? An ice-cream? An iceberg?

Individual Predictions

What?	Initial Prediction	Revised Prediction
An ice-cube		
An ice-block		
An iceberg		

Group Predictions

After talking to my group did my prediction change?	
Why? Why not?	

Experiment 1:
Classroom ice melt

How long did it take? _____

SCIENCE

Melting an iceberg
(Ref: Howitt. C & Blake. E (ed) (2010) Planting the seeds of science. Australian Learning and Teaching Council p112)

Experiment 2:
Group ice melt in different locations

We will change:	**We will measure:**
We will keep these things the same. The size of the ice-cube and the ice-block. Anything else?	
Ice-cube What do you think will happen? Why?	
Ice-block What do you think will happen? Why?	

School Curriculum and Standards Authority

CURRICULUM AND ASSESSMENT OUTLINE

ASSESSMENT ACTIVITY YEAR 1

SCIENCE

Melting an iceberg
(Ref: Howitt. C & Blake. E (ed) (2010) Planting the seeds of science. Australian Learning and Teaching Council p112)

We changed:	We measured:
When we changed, what happened to the ice-cube?	
When we changed, what happened to the ice-block?	
Talk about this with other people. Why do you think this happened?	
Did you have any difficulties? How could you improve this investigation?	

SCIENCE

Melting an iceberg
(Ref: Howitt. C & Blake. E (ed) (2010) Planting the seeds of science. Australian Learning and Teaching Council p112)

Experiment 3:
Iceberg predictions

We will change:	**We will measure:**
We will keep these things the same.	
Iceberg What do you think will happen? Why?	
What happened?	
How long did it take?	

SCIENCE

Melting an iceberg
(Ref: Howitt. C & Blake. E (ed) (2010) Planting the seeds of science. Australian Learning and Teaching Council p112)

Section 5: Assessment

Note: the concept of time-seconds, minutes, hours, days was a difficult concept and their understanding varied widely according to their prior experience/knowledge. The measurements of time were changed over the course of the lessons to match the understanding of the children i.e. at the beginning we used seconds, minutes and hours but for the revised predictions for the iceberg we used ‘after recess’ ‘before lunch’ ‘after school’ ‘tomorrow morning’.
Participation and interest in the ‘iceberg melt’ contributed to many children’s discussions both formally and informally and their ability to describe changes occurring. It helped in their understanding of time; conducting experiments and determining that to keep an experiment valid they cannot change anything. The discussions, recorded predictions and writing was used to assess their understanding and highlighted the importance of following instructions, recording predictions, making observations and following procedures (by not changing anything when conducting an experiment).

School Curriculum and Standards Authority

CURRICULUM AND ASSESSMENT OUTLINE

ASSESSMENT ACTIVITY YEAR 1

SCIENCE

Melting an iceberg
(Ref: Howitt. C & Blake. E (ed) (2010) Planting the seeds of science. Australian Learning and Teaching Council p112)

Rubric - please note that the following marking guidelines are those developed by the teacher for this task in the context of their teaching and should not be viewed as a model that should be used for all assessment activities.

Following Instructions	Posing questions; Making predictions	Able to conduct a simple experiment individually	Able to conduct a simple experiment in a group	Able to keep the experiments variable constant	Record findings and share observations
Found it difficult to listen to instructions so had difficulty participating in the activity	Has difficulty thinking of a question and/or making a prediction	Found it difficult to stay on task while conducting an individual experiment	Found it difficult to stay on task while conducting an experiment in a group	Found it difficult not to change the conditions of the variables in the experiment	Unsure what to record. Had difficulty discussing observations about their own and/or group experiments
Found it difficult to follow a simple set of instructions	With help is able to pose a question or make a prediction	Was able to stay on task most of the time while conducting an individual experiment	Was able to stay on task most of the time while conducting an experiment in a group	With help is able to change the conditions of the variables in the experiment	With help is able to record their findings. Needed prompting when discussing observations about their own and/or group experiments
Able to follow a simple set of instructions	Able to pose a question or make a prediction independently	Able to stay on task while conducting an individual experiment	Able to stay on task while conducting an experiment in a group	Able to keep the conditions of the variables in the experiment constant	Able to record their findings and discuss observations about both their own and group experiments without prompting
Able to follow a simple set of instructions and make suggestions to improve the procedure	Able to pose a question or make a prediction independently and make suggestions to help others	Able to stay on task while conducting an individual experiment and encouraged others to stay on task	Able to stay on task while conducting an experiment and encouraged others to stay on task in a group	Able to keep the conditions of the variables in the experiment constant and reminded others to do the same	Able to accurately record their findings and discuss observations about their own experiment as well as make observations about peer and whole class experiments

School Curriculum and Standards Authority

CURRICULUM AND ASSESSMENT OUTLINE

ASSESSMENT ACTIVITY YEAR 1

SCIENCE

Melting an iceberg
(Ref: Howitt. C & Blake. E (ed) (2010) Planting the seeds of science. Australian Learning and Teaching Council p112)

Section 6: Reflection

To what extent did the activity sequence provide an opportunity for the children to demonstrate their skills and understandings of the curriculum content?	This was a wonderful series of activities to demonstrate increasing knowledge of predictions, following procedures and recording information in new ways.
What range of achievement was able to be demonstrated by the children?	Some children participated fully but found it hard to predict or imagine anything beyond what was presented to them. Other children were asking questions or making statements that showed they were thinking beyond the experiment i.e. the ice-cube would melt more quickly if we went outside and put it in the sun; the iceberg would melt more quickly if it wasn't so cold; I wonder what would happen to a real iceberg?
Was any additional support required for some children to enable them to participate?	Support was given with ideas and writing which would be done anyway. Leading questions at the introduction phase helped some children who had never considered what elements make ice melt.
What misconceptions were revealed from students' responses to the activity?	The children learnt it was not about 'winning' or being 1st. That it's very important in an experiment not to change things half way through or the results become 'invalid'. Conditions have to remain the same.
How could the data you collected from the assessment task be used to inform planning of future teaching and learning?	Data collected helped to reveal those children who thought beyond what the teacher says. The children that caused an invalid experiment now realise the importance of maintaining variables during data collection. This has led to an increased focus on following procedure.
How did the activity link to other learning areas?	This linked well to mathematics (make graphs, time and seasons, measuring) and literacy (describing words, writing and reading) and ICT (creating a pictorial poster of the experiment).
Any other comments related to the activity?	The children want to do another experiment of melting an iceberg in the summer as they think it would melt quickly. We can then compare that result to the 31.5 hours it took in the winter.